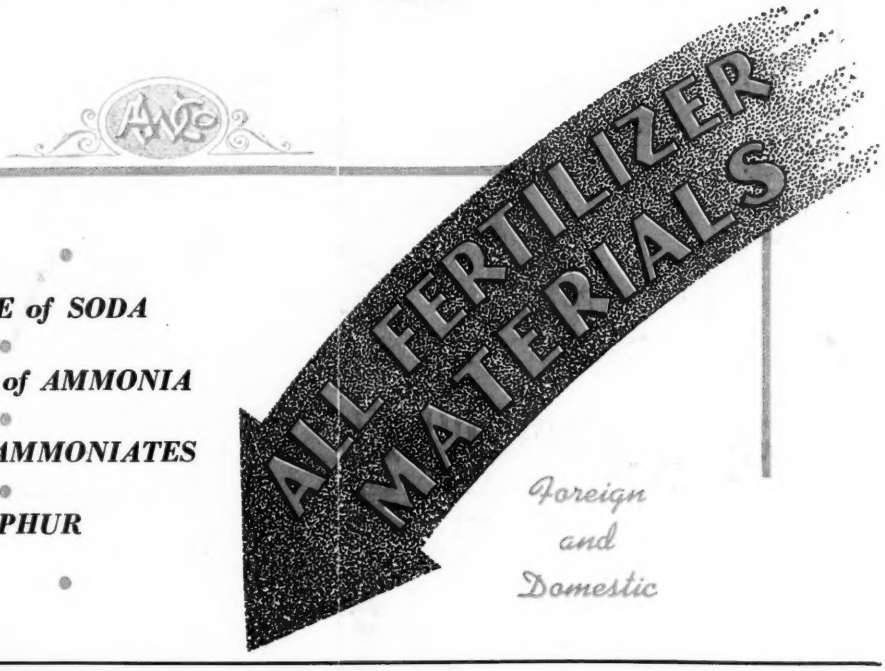
The American Fertilizer

Vol. 97 DECEMBER 5, 1942 No. 12



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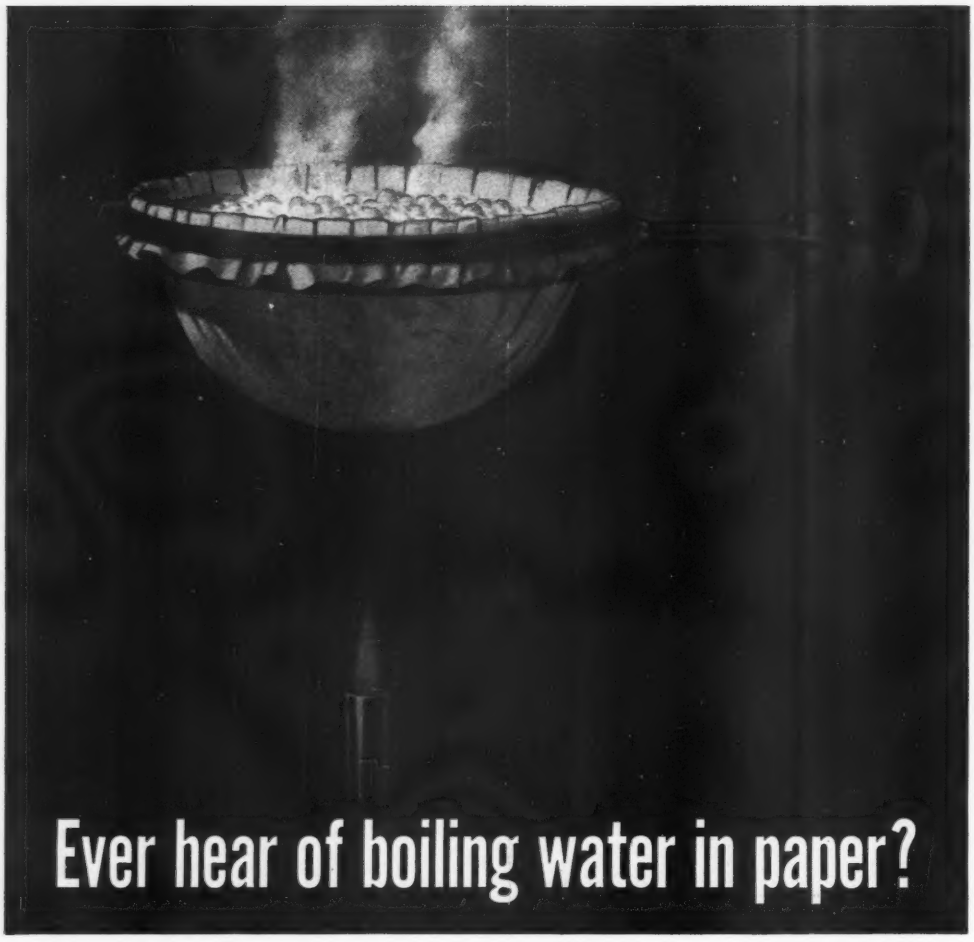

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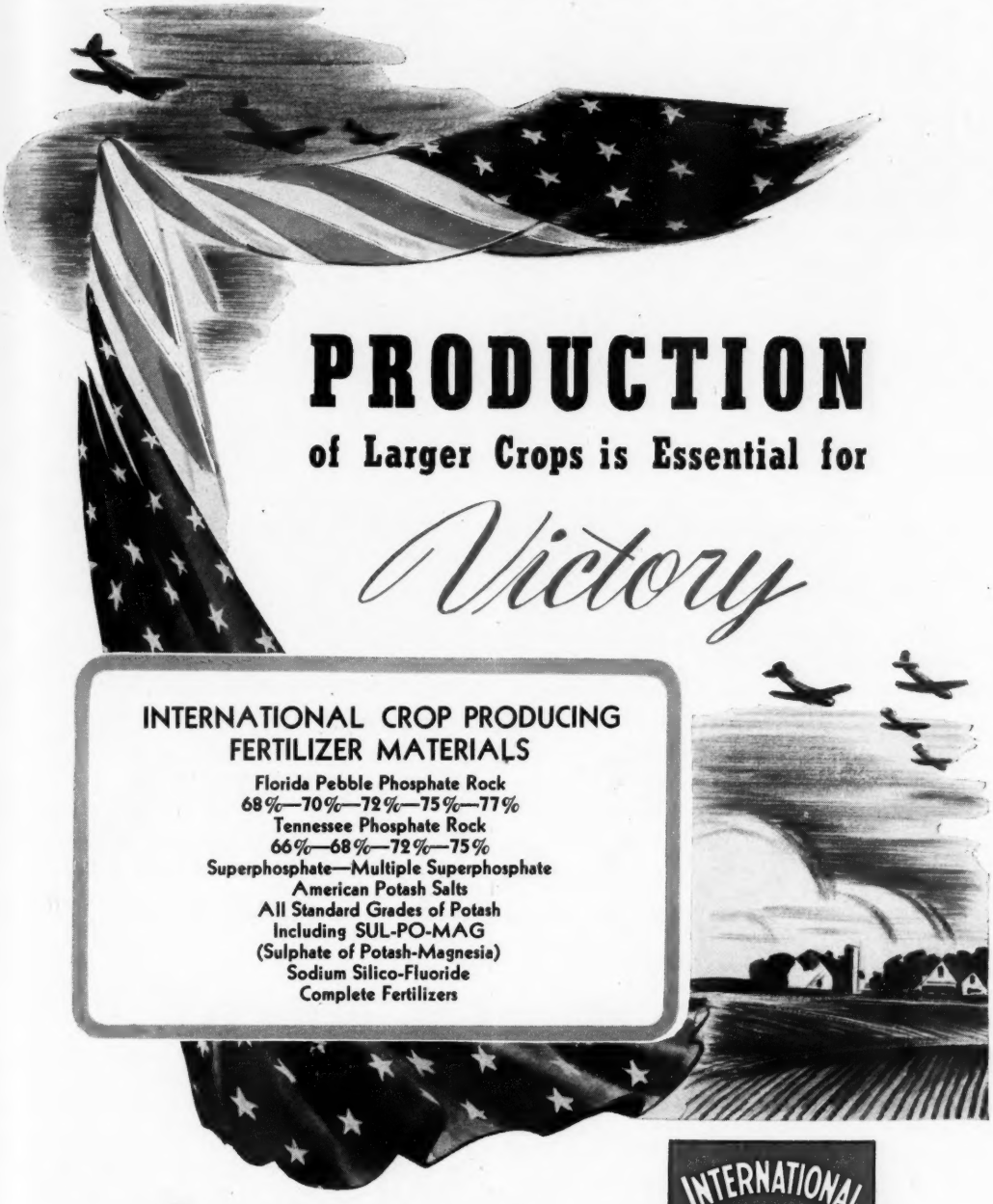

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See page 23

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Vol. 97 DECEMBER 5, 1942 No. 12

Obligations and Opportunities*

By JOHN A. MILLER

President of The National Fertilizer Association

THIS is strictly a business meeting—the only business of any importance at this time is the business of getting on with this war and bringing it to a successful conclusion; for if we do not, it will not be our privilege to determine how we may conduct ourselves in the future. That will be determined for us.

Our industry faces a heavy obligation in this war effort, and the manner in which we discharge it and perform our task will be the test of whether or not we are worthy to take our place with many other industries whose accomplishments have already made it possible for our country to equip, transport and maintain our fighting men in the four corners of the earth.

Our test is yet to come because, up until the present time, our task has been simple and the dislocations which we have suffered have not been great. To understand the obligations which we as an industry must face is comparatively simple. Discharging these obligations may not be so easy. We are faced principally with the difficulty of equitably distributing the available supply of nitrogen in order that it may do the most good on the right crops to assist in the present emergency. War Production Order M-231 together with the Grade Substitution Plan changes the customary freedom of choice that a farmer had in buying his fertilizer. It will be difficult enough to explain these things to the trade and particularly so in view of the fact that our access to sufficient gasoline and tires is problematical.

It will also be difficult to cope with the problem of loading box cars to their marked capacity and our association has been striving with all the resources at its command to get permission for a minimum loading of 60,000 lb. in order that we may have a reasonable chance to ship fertilizer that will arrive at its destination in good condition. A good deal of concern has been felt over price ceilings in the face of increasing cost for transportation, bags and available supplies of nitrogen. It has become manifestly impossible for some operators to do business without substantial loss for the spring of 1943 on the same price bases as those prevailing for the year 1942. We have recently received assurance from the proper authorities of OPA that relief from this situation will be forthcoming and we have with us here Mr. Westberg, of the Office of Price Administration, to discuss this subject.

Thus, briefly, have been mentioned the major difficulties with which we are now confronted and which must be overcome. Surely there has occurred some trouble in switching from cloth to paper bags, but in summing up the total of our difficulties, it is only fair to say that we certainly have not been subjected to any such complete change and upheaval as has been faced and overcome by many other industries of like or greater size, the examples of which are too numerous to require mention.

At the suggestion of Dr. William H. Martin, Dean and Director of the New Jersey College of Agriculture and Experiment Station, who is also a consultant on fertilizer and insecticides for the War Production Board, the association has taken the initiative in calling a conference on post-war nitrogen utilization problems. This conference was attended by representatives of many of the national

*The Presidential Address, delivered at the Southern Meeting of the National Fertilizer Association, at Atlanta, Ga., November 17, 1942.

societies and agencies. Only last week at a meeting of the American Society of Agronomy in St. Louis, the joint committee on post-war nitrogen problems was organized to study the question of the most advantageous use of an increased supply of chemical nitrogen that will undoubtedly be available after the war. In this connection it seems to me that we have a wonderful opportunity, particularly in view of the simplified grade situation, to perform a great service for agriculture in the post-war period.

Many of you recall vividly the situation that existed in our industry during the last war. Potash was practically unobtainable and prices of other raw materials skyrocketed to a marked extent. Many manufacturers felt that they had realized handsome profits and so they had. The volume of business continued to be good for some two years after the war, but we shall never forget what the commodity slump in 1921 did to war profits in this industry. There certainly will be no repetition of such a situation, as wise precaution has been taken that no such build-up will be permitted and, therefore, no such letdown suffered.

As drastic as may be some of the changes in our normal procedure, we have the opportunity of tackling these problems certainly without our most pressing normal problem, that of doing a good tonnage, which is already taken care of. It is generally agreed that the volume of business available will tax our ingenuity and the capacity of many of our plants.

Naturally there may be a feeling on the part of some that we as an industry are being subjected to too much regulation from Washington. Personally, I feel that in normal times, private business is better able to solve trade and distribution problems than is government, but these are not normal times and certainly there has been sufficient dislocation of shipping facilities and raw materials to warrant coordination of our effort by governmental authorities.

The President has mentioned the four freedoms: Freedom of Speech, Freedom of Worship, Freedom from Fear, and Freedom from Want. We are seeking to guarantee these freedoms to the people of all nations. We are so used to enjoying them ourselves that they are taken as a matter of course. We have in Washington assisting us in the solution of our many problems men who are familiar with the fertilizer business and who, in most cases, have been drawn directly from among our number. We exercise our freedom of expression and say that these gentlemen have consulted us in all matters of importance freely and frequently, and are still doing so. We feel that they have been reasonable, cooperative and intelligent in their approach to our difficulties. Certain vexing delays have occurred which have somewhat inconvenienced us, but we have every reason to hope that those problems which have not been solved as yet may soon be ironed out. We make this statement because we mean it. If we had the opposite opinion, we would be just as free to express it. We are fighting this war to make sure that our right to a free expression of honest opinion may be maintained.

Our obligations to agriculture and, therefore, to the war effort are clear cut. Our difficulties are far from insuperable; by reason of the necessity for streamlined procedure during the emergency, we have for the future an opportunity to function more efficiently and to serve better in the post-war period of rehabilitation. We are indeed fortunate. Let us demonstrate our appreciation of this fact by real service to our industry and our country.

October Sulphate of Ammonia

An increase of 3 per cent in the production of by-product sulphate of ammonia during October was recorded by the U. S. Bureau of Mines. The tonnage for that month totaled 64,903 as compared with 62,942 in September. For the first 10 months of the year, production showed about the same proportional increase, 640,099 tons as compared with 618,252 tons in 1941. Shipments dropped from 66,296 tons in September to 63,802 tons in October, while stocks on hand rose from 54,623 tons at the end of September to 55,447 tons on October 31st. Comparative figures are as follows:

	Sulphate of Ammonia Tons	Ammonia Liquor Tons NH_4
Production:		
October, 1942	64,903	2,992
September, 1942	62,942	2,833
October, 1941	63,357	2,630
January-October, 1942	640,099	28,175
January-October, 1941	618,252	26,090
Shipments:		
October, 1942	63,802	3,035
September, 1942	66,296	2,958
October, 1941	66,078	2,893
Stocks on Hand:		
October 31, 1942	55,447	1,016
September 30, 1942	54,623	858
October 31, 1942	35,252	691
September 30, 1942	39,894	837

The Fertilizer Situation and the War*

By F. W. PARKER

Division of Soil and Fertilizer Investigations, Bureau of Plant Industry, U. S. Department of Agriculture

MORE than 2,300,000 farmers use a total of approximately 9,000,000 tons of commercial fertilizer costing them some $300,000,000. An industry of such magnitude, deriving its raw materials from widely scattered sources, obviously would be affected by the war program of the nation. It is our purpose to consider the effect of the war on fertilizer supplies and practice for the 1942–43 season.

Demand For Commercial Plant Food

There may be a shortage of fertilizers in the spring of 1943. Two elements, namely demand and supply, operate to produce a shortage. First consideration will be given to the influence of the war on the demand for fertilizers.

Under the stimulus of war, farm production and farm prices have increased so that the total farm cash income has increased from an average of $8,648,600,000 for the period 1936–1940 to $11,830,000,000 in 1941 and an estimated $15,600,000,000 in 1942. This 80 per cent increase in farm cash income will certainly cause a great increase in the demand for fertilizers.

In the five-year period referred to, 2.53 per cent of the previous year's farm cash income was spent for fertilizer. If the same percentage of the 1942 income is spent for fertilizer in 1943, fertilizer sales would approximate 11,740,000 tons, an increase of 4,135,600 tons over the average tonnage for 1936–40. This potential demand and the relationship between farm income and fertilizer consumption is shown in Fig. 1. The figure indicates that the demand in 1942 was about 750,000 tons greater than the supply. In 1943 the indicated demand may exceed the expected supply by almost 3,000,000 tons.

On the foregoing basis, and including Hawaii and Puerto Rico, it may be estimated that in 1943 there will be a market for 665,000 tons of nitrogen, 1,100,000 tons of phosphoric acid, and 655,000 tons of potash for fertilizers.

*An address before the Southern Meeting of the National Fertilizer Association, Atlanta, November 17, 1942.

In time of war the demand for a commodity may greatly exceed the quantity required to achieve national objectives. This is the case with respect to fertilizers. Table I gives the calculated consumption of nitrogen by various crops in 1941 and the amount of fertilizer nitrogen required to meet the national crop production goals in 1943. The latter figure is based on the same average rate of fertilization and the same average yields as in 1941. It does not reflect changes in nitrogen fertilization which will result from recent governmental action. These data indicate a nitrogen requirement of 462,000 tons, some 203,000 tons less than might be expected to result from the great increase in farm cash income.

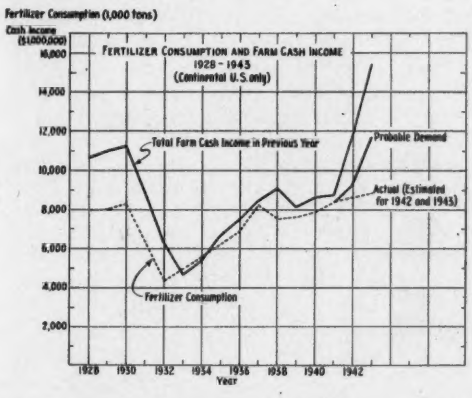

Fig. 1. Relation between fertilizer consumption and farm cash income.

The 1942–43 requirements for phosphoric acid and potash have been estimated at 1,100,000 tons P_2O_5 and 512,000 tons K_2O. These estimates, unlike the estimate of nitrogen requirements, are based on the new grades established for 1942–43 and on increased use of phosphates and potash for legumes. They also include the tonnage to be distributed by the Agricultural Adjustment Administration.

TABLE I

NITROGEN CONSUMPTION BY CROPS IN 1941 AND UNADJUSTED REQUIREMENTS FOR 1943

(Tons of Nitrogen)

Crop	Used in 1941	Requirements 1943[1]
Cotton	85,755	90,665
Corn	88,636	91,594
Potatoes	34,384	36,570
Oats and barley	15,152	16,250
Tobacco	21,112	23,606
Vegetables	63,246	66,679
Fruits and nuts	51,112	51,112
Wheat	18,649	14,689
Sugar cane and beets	7,178	8,044
Forage crops	8,225	8,225
All other crops	27,433	18,702
Total Cont. U. S.	420,881	426,136
Hawaii and Puerto Rico	35,281	36,000
Total U. S.	456,162	462,136

[1] Based on 1941 average rates of fertilization.

The Supply of Commercial Plant Food

The outbreak of war in 1939 immediately began to influence the source and quantity of our supplies of fertilizer materials. Fortunately, because of the development of the domestic nitrogen, phosphate, and potash industries, this war had less effect on our fertilizer supplies than the first world war.

The effect of the war on our nitrogen supply is shown by the data in Table II. The war stopped substantial imports from Europe, increased imports from Chile, reduced our exports of fertilizer nitrogen, increased domestic production of by-product ammonium sulphate, and diverted nearly all domestic synthetic ammonia products from fertilizer to war purposes The net effect of all of these changes is to give, with normal use of natural organics, an expected supply of 408,000 tons of nitrogen for 1942–43. This compares with consumption of 390,002 tons in 1939, and 456,908 tons in 1941. In only three years, 1937, 1941, and 1942, has consumption exceeded 400,000 tons.

The data on nitrogen supplies include items on which considerable uncertainty exists, due to factors connected with the war. The supply of Chilean nitrate of soda may be smaller or larger than the indicated tonnage. The production of synthetic ammonia liquors and Uramon has recently been resumed on a limited scale. There will be 10,000 or more tons of nitrogen from these sources. This represents a small but distinct improvement in the nitrogen situation.

The indicated supply of fertilizer nitrogen is 54,000 tons less than the requirement estimate given in Table I. It is some 257,000 tons lower than the calculated potential demand based on farm cash income. The adjustment of supply to requirements in the face of the great demand for nitrogen constitutes one of the major problems of fertilizer distribution.

TABLE II

FERTILIZER NITROGEN SUPPLIES FOR U. S. CONSUMPTION

(Short Tons Nitrogen)

Material	1939	1941	1942–43
Ammonium sulphate	118,650	138,248	160,000
Sodium nitrate	120,731	146,300	172,000
All ammonia liquors	47,500	65,200	5,000
Cyanamid	20,811	25,700	9,000
Uramon, calurea, etc.	7,526	20,000	5,000
Ammonium phosphates	6,079	6,200	5,000
All other chemicals	20,410	3,850	2,000
Natural organics	48,295	51,410	50,000
Total	390,002	456,908	408,000

TABLE III

U. S. SUPPLY OF PHOSPHORIC ACID FOR FERTILIZERS

(Short Tons P_2O_5)

Material	1939	1941	1942–43
Commercial Distribution			
Superphosphate	566,000	650,000	780,000
Double superphosphate	61,000	66,000	60,000
Other phosphates	51,000	50,000	38,000
Total	678,000	766,000	868,000
Government Distribution			
Superphosphate	0	146,000	240,000
Double superphosphate	77,000	45,000	0
Other phosphates	0	6,000	0
Total	77,000	197,000	240,000
Grand Total	755,000	963,000	1,108,000

The supply situation as regards superphosphate is summarized in Table III. These data show that there will be an abundant supply of phosphoric acid. This will be achieved without capacity production by the industry as it has a rated capacity of 1,712,000 tons P_2O_5. The available supply of double-superphosphate will probably be somewhat reduced, due to exports to other United Nations.

Transportation problems, particularly the rail movement of rock phosphate and sulphur, are the factors that might limit the indicated production of phosphoric acid.

The potash supply situation, Table IV, is similar to the phosphate case in that there is

no shortage. The war has stopped all potash imports. Domestic consumption has increased from 405,000 tons K_2O in 1939 to 458,000 tons in 1941 while the 1942–43 supply for fertilizer purposes is estimated at 560,000 tons. This assumes plant operation at 95 per cent over-all efficiency. The supply may be reduced somewhat by increased exports to some of the United Nations. In any case, it appears we will have enough potash to meet our requirements but not enough to meet all possible demands.

The favorable potash situation is due, of course, to the rapid development and expansion of our domestic industry. We now have ample domestic supplies of all potash salts,

TABLE IV

U. S. SUPPLY OF POTASH FOR FERTILIZERS

(Short Tons K_2O)

Material	1939	1941	1942–43
Muriate of Potash			
Domestic	273,508	374,783	460,000
Imported	110,040	8,300	0
Manure Salts and Kainit			
Domestic	8,039	28,626	40,000
Imported	3,223	0	0
Sulphate of Potash			
Domestic	146	32,531	45,000
Imported	30,060	0	0
Miscellaneous	20,000	13,760	15,000
Total	405,000	458,000	560,000

[1] Vegetable potash, natural organics, nitrate of soda-potash, etc.

potassium nitrate excepted, for our normal fertilizer and chemical requirements.

The plant food demand, requirement, and supply situation as developed to this point is shown in Table V. Only in the case of nitrogen is there a real shortage when compared to requirements. There the shortage amounts to about 12 per cent. The situation, of course, is complicated by the fact that the demand is much greater than the indicated requirements.

The Fertilizer Distribution Problem

Long before Pearl Harbor, the U. S. Department of Agriculture was following the fertilizer supply and demand situation. When it became apparent that there would probably be a considerable shortage of nitrogen but rather ample supplies of phosphoric acid and potash, the war agencies and the U. S. D. A. established the following general principles for developing an equitable plan of fertilizer distribution.

1. Crops most essential to the war effort should have first call on our fertilizer nitrogen supplies.
2. Chemical nitrogen should not be used on non-essential crops, on essential crops of which there was a very large surplus in storage, or under conditions where it gives a low return.
3. The consumption of phosphoric acid and potash should be increased to utilize most of our productive capacity and to partially offset the lower yield that would result from reduced nitrogen fertilization.
4. With the limitations indicated, nitrogen should be distributed on a historical basis.

TABLE V

SUMMARY OF ESTIMATED DEMAND, REQUIREMENTS, AND SUPPLY OF PLANT FOOD FOR 1942–43

(Short Tons)

	N	P_2O_5	K_2O
Demand	665,000	1,100,000	655,000
Requirement	462,000	1,100,000	512,000
Supply	408,000	1,108,000	560,000
Consumption, 1941	457,000	963,000	458,000

Following Pearl Harbor, a Technical Committee on Fertilizers, under the chairmanship of Dr. R. M. Salter and later W. F. Watkins, with the assistance of the Land-Grant Colleges and the National Fertilizer Association, assembled a large amount of data relating to fertilizers. At the same time the Industry Advisory Committee was studying the problem of fertilizer distribution. Both studies indicated the advisability of standardizing fertilizer grades as an important step in any distribution program.

The War Production Board and the Office of Price Administration worked with the U. S. D. A. in a fertilizer grade standardization program. The National Fertilizer Association rendered valuable assistance in many ways. The objectives of the program were:

1. To reduce the number of grades sold in each State to the minimum number required for efficient fertilization of the State's crops.
2. To secure greater uniformity of grades within regions.
3. To adjust the plantfood ratio in grades so that nitrogen consumption in mixed fertilizers would be reduced about 20 per cent but the consumption of phosphoric acid and potash would be increased.

(Continued on page 22)

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Sectional Fertilizer Meetings

At the request of the War Production Board, a series of sectional meetings has been arranged by the National Fertilizer Association to give industry officials and managers, agricultural workers and farm organization representatives an opportunity to get first-hand information concerning the 1943 fertilizer program, with a chance to discuss the same.

The following meetings have been arranged: December 7, Baltimore, Md. (Emerson Hotel); December 8, Raleigh, N. C. (Sir Walter Hotel); December 9, Columbia, S. C. (Columbia Hotel); December 10, Jacksonville, Fla. (George Washington Hotel); December 11, Atlanta, Ga. (Biltmore Hotel); December 14, Montgomery, Ala. (Jefferson Davis Hotel); December 15, Shreveport, La. (Washington-Youre Hotel); December 17, Chicago, Ill. (Hotel Sherman); December 18, New York City (Pennsylvania Hotel). Each meeting will begin at 10.00 A. M. A meeting will also be held in Boston, the date to be announced later.

The program for each meeting will include the following topics: (1) Fertilizer Conservation Order No. M-231 and amendments; (2) crop production goals in relation to fertilizer; (3) what The National Fertilizer Association can do to help Government and agriculture; (4) the WPB field service plan—its organization and functions; (5) fertilizer pricing under OPA; and (6) a brief discussion of insecticide and fungicide orders and directives (in areas where this subject is important).

The following are among the Government officials who will attend and speak at one or more meetings: WPB—M. K. Derrick, T. E. Milliman, L. G. Porter, Warren Moyer, and Melvin Goldberg; OPA—Cedric Gran and R. A. Payne. U. S. Department of Agriculture speakers will be announced later.

Corn Loan Rates

Loan rate on corn, recently announced by the Commodity Credit Corporation, will vary from 73 to 89 cents a bushel for the 1942 crop in the commercial growing area. This will be about 6 cents a bushel higher on the average than loans on the 1941 crop. The loans, which are based on 85 per cent of the parity price of corn prevailing on September 15th, will be available from December 1, 1942 to September 30, 1943. Rates outside the commercial area will be 75 per cent of the commercial area rates.

Obituary

Raymond A. Schultz

Raymond A. Schultz, president of the Reading Bone Fertilizer Company, Reading, Pa., died suddenly at his home on November 7th. Mr. Schultz, who was 61 years of age, was a native of eastern Pennsylvania and graduated from Perkiomen Seminary in 1902. After serving as secretary of the Seminary from 1902 to 1912, he entered the employ of the Reading Bone Fertilizer Co. He held the office of secretary from 1915 until the death of his father, John H. Schultz, in 1926, when he succeeded the latter as president of the company. He was a former president of the Inland Fertilizer Manufacturers' Association.

Always interested in civic progress, Mr. Schultz gave valuable service in the Kiwanis Club, the local Council of Civic Clubs and the Boy Scout Council. For 20 years he served as treasurer of the borough of Mt. Penn, where his home was located. Through his business connections, he had a wide circle of friends in the fertilizer industry.

Mr. Schultz is survived by his widow, his stepmother, three brothers and three sisters.

Fertilizer Patents by U. S. D. A. Employees

Among the patents recently granted to employees of the U. S. Department of Agriculture are three which relate to fertilizer production, namely, the granulation of fertilizers, the production of calcium metaphosphate, and the production of dicalcium phosphate, respectively. The first two have been assigned to the Department of Agriculture to be licensed to interested concerns for development and use under regulation of the Department; in the case of the third (dicalcium phosphate) the government retained "shop rights," that is, the free use of the invention in government departments. A brief description of these patents follows:

Process for the Granulation of Fertilizers, John O. Hardesty, Kenneth D. Jacob, and William H. Ross. Granulation provides a material in graded size with the elimination of fine dusty particles. The tendency to cake in bags is decreased; the more uniform distribution by machinery in the field is accomplished; and more efficient utilization of the plant food by plants is made possible thereby affording considerable savings.

Process for the Production of Calcium Metaphosphate and Hydrogen, Stephen Brunauer and John F. Shultz. This provides the methods for the simultaneous production of a fertilizer phosphate slightly soluble in water and hence preventing phosphate conversion in the soil to an insoluble form unavailable for plant use. Hydrogen is produced which may be employed for combining with nitrogen to form ammonia in the fixation of nitrogen by the synthetic ammonia process. This process has been subjected to pilot plant scale operation by the TVA.

Process for the Production of Dicalcium Phosphate, Edward J. Fox. This provides a relatively insoluble form of phosphate fertilizer which is still available for plant use due to its solubility in weak acid occurring in soil. Soluble phosphate is converted to very insoluble forms in many soils so that much of it remains unusable by plants. Dicalcium phosphate employed as fertilizer on such soils allows better utilization of plant food and resists loss by fixation in the soil.

Cushman and Haynes Appointed to Industry Committee

George Cushman, of Riverhead, Long Island, has been reappointed to serve on the Fertilizer Industry Advisory Committee, succeeding L. H. Carter. Mr. Cushman was a member of the original committee, but his connection with OPA on March 1, 1942, made him ineligible and he resigned. Boyless W. Haynes, of Wilson & Toomer Fertilizer Company, Jacksonville, Fla., has been appointed a member of the committee by WPB.

Paper Bag Industry Committee Formed

The War Production Board has announced the formation of an Industry Advisory Committee to represent the Multi-Wall Paper Shipping Sack Industry. Jean E. Zeller, of the Containers Branch of WPB, is the Government Presiding Officers. The other members of the committee are F. G. Bemis, Bemis Bro. Bag Company, Boston, Mass.; George Brown, Raymond Bag Company, Middletown, Ohio; M. J. Davis, Hammond Bag and Paper Company, Wellsburg, W. Va.; Willard J. Dixon, St. Regis Paper Company, New York City; F. H. Ludington, Chase Bag Company, New York City; J. L. Madden, Hollingsworth & Whitney Company, Boston, Mass.; A. A. Scholl, Bagpak, Inc., New York City.

September Superphosphate

September statistics on superphosphate, announced on November 18th by Director J. C. Capt, Bureau of the Census, Department of Commerce, shows that production amounted to 462,718 tons, an increase of 3.8 per cent over the 445,860 tons reported for August 1942 and an increase of 42.8 per cent over the 324,005 tons reported for September a year ago. Shipments in September 1942 amounted to 311,043 tons, an increase of 15.7 per cent over the 268,847 tons reported for August 1942 and a 17.7 per cent increase over the 264,320 tons reported for September a year ago. Stocks on hand at the end of September 1942 amounted to 1,041,217 tons, a 9.4 per cent increase over the 951,809 tons reported for the previous month and an increase of 14.6 per cent over the 908,809 tons reported to September 1941. Comparability of the data on receipts, shipments and stocks is slightly affected by the reclassification of certain quantities of superphosphate formerly reported in dry base and mixed goods. The item dry base and mixed goods was dropped from the published report in August. In September, the superphosphate formerly included in dry base and mixed goods was reported as either normal or concentrated superphosphate. Data for this report were obtained from reports by 52 manufacturers, representing 95 per cent of the total value of superphosphate as reported at the Biennial Census of Manufactures, 1939.

Statistics for September relating to production, receipts, shipments, and stocks include all grades of superphosphate (normal, concentrated, and wet base goods) converted to a basis of 18 per cent available phosphor c acid. The reports for August 1942 and for previous months showed data on a 16 per cent basis. However, for comparative purposes they have been converted to 18 per cent A. P. A. basis in the table below.

Item	1942 September	1942 August	1941 September	1940 September	Total 9 months (January–September) 1942	1941	1940
Stocks on hand beginning of month	1,004,258[1]	914,258	869,346[2]	969,941[3]	....	....	....
Production	462,718	445,860	324,005	290,771	3,742,931	3,152,407	2,807,151
Received from other acidulators (including exchange transfers)[4]	5,984	35,274	24,432	23,538	265,712	368,555	286,127
Book adjustments (account of inventories)	+3,251	+5,640	−2,973	−2,073	−28,091	−2,583	−26,791
Total supply	1,476,211	1,401,032	1,214,810	1,282,177	....	....	....
Disposition, total	434,994	449,223	[5]	[5]	[5]	[5]	[5]
Shipments, total	311,043	268,847	264,320	263,090	2,900,784	2,803,428	2,307,107
To mixers	145,047	135,914	98,210	121,029	1,410,183	1,251,168	1,189,935
To other acidulators (including exchange transfers)	32,130	45,567	49,749	25,774	402,065	479,917	351,432
To all others (including Government agencies)	133,866	87,366	116,361	116,287	1,088,536	1,072,343	765,740
Used in reporting plants	123,951	180,376	[5]	[5]	[5]	[5]	[5]
Stocks on hand, end of month	1,041,217	951,809[1]	980,809	1,009,047	....	....	....

[1] Stocks shown here as on hand beginning of September are slightly larger (on an 18 per cent basis) than those reported for the end of August because September stocks include some superphosphate which was reported by manufacturers as dry base and mixed goods in August. Figures for dry base and mixed goods were not included in the August summary.

[2] Reported as stocks on hand August 31, 1941. [3] Reported as stocks on hand August 31, 1940.

[4] Data for September and August 1942 exclude base and mixed goods; data for other months shown include base and mixed goods.

[5] Not available.

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FERTILIZER MATERIALS MARKET

NEW YORK

Scarcity of Sulphate of Ammonia Increases Demand for Oil Meals but Scarcity in These Materials Widespread. No Change in Nitrate of Soda Prices. North African Occupation Should Help Phosphate Situation.

Exclusive Correspondence to "The American Fertilizer"

NEW YORK, December 1, 1942.

Sulphate of Ammonia

With no additional supplies of sulphate of ammonia being made available to fertilizer manufacturers, it will undoubtedly be necessary for them to turn to oil meals. With the probability of higher ceilings for mixed fertilizers being placed by OPA, fertilizer manufacturers are now trying to buy these oil meals in larger quantities. However, there is considerable scarcity in all of these meals, especially for nearby deliveries, in most cases material are contracted for and practically nothing is available until January or February delivery.

Nitrate of Soda

The domestic manufacturer has now announced the December price, same being the same as for the previous month and undoubtedly the price for the Chilian material will also remain the same. However, practically no nitrate of soda is being delivered to fertilizer manufacturers, who are more interested in the obtaining of the material than in the price of same.

Potash

There is no change whatsoever in this situation.

Superphosphate

There is no change in this situation but it is within reason to believe that the taking over of North Africa by the Allies may mean that phosphate rock, which has been going into Germany, may now be shipped to England. If Moroccan phosphate rock does move into England in large quantities, it may be that the large demands for triple superphosphate for England may be lessened, which would certainly help the situation in this country.

BALTIMORE

No Features in Fertilizer Materials Market. Organic Ammoniates Well Sold Up. Potash in Ample Supply. Superphosphate Status Unchanged.

Exclusive Correspondence to "The American Fertilizer"

BALTIMORE, December 1, 1942.

There have been no outstanding features in connection with the fertilizer industry during the past two weeks.

Ammoniates—Blood and tankage are practically unobtainable for fertilizer purposes and practically the entire production is going into the manufacture of feed.

Nitrogenous Material—The market on domestic nitrogenous is fairly well sold up and the same condition prevails with vegetable meals such as cottonseed, linseed and soya bean meal. No offerings are on the market at present, and most producers are completely sold up until next February.

Sulphate of Ammonia—The tonnage of this material allocated to fertilizer manufacturers continues on a restricted basis, although manufacturers are endeavoring to secure more liberal supplies in order to enable them to take care of business which will be available during the coming season.

Nitrate of Soda—Importers of the Chilean product have extended November prices to December, subject to change without notice, and all allocations continue to be made through OPA.

Potash—Practically all domestic producers are sold up and it is anticipated that stocks on hand and contracts booked will be ample to cover buyers' legitimate requirements during the coming season.

Superphosphate—There is no change in the situation and producers continue to quote ceiling price of $9.60 per ton of 2000 lb., basis 16 per cent for run-of-pile. No stocks are

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POTASH SALTS
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accumulating and producers are not anxious sellers at present level of price.

Bone Meal—There has been some little interest shown in both raw and steamed bone meal recently but up to the present time offerings are practically nil.

Bags—The Government recently issued regulations prohibiting the use of new bags for fertilizer but without disturbing the status of second hand, paper or cotton bags.

CHICAGO

Little Trading in Fertilizer Organics. Buyers Now Looking for Sellers. Feed Market Unchanged With Supplies Scarce.

Exclusive Correspondence to "The American Fertilizer"

CHICAGO, November 30, 1942.

Trading in fertilizer organics has been very light in this market, owing to lack of offerings. Any lots which do appear are quickly absorbed. At the Convention in Atlanta, the usual situation was reversed: buyers were looking for sellers.

In the feed market conditions are unchanged. Material is sought by mixers at ceiling prices, but such supplies are not plentiful.

No change in ceiling prices has occurred: High grade ground fertilizer tankage, $3.85 to $4.00 ($4.68 to $4.98½ per unit N) and 10 cents; standard grades crushed feeding tankage; $5.53 per unit ammonia ($6.72 per unit N); blood, $5.38 ($6.54 per unit N); dry rendered tankage, $1.21 per unit of protein, Chicago basis.

French Potash Company Moves Offices

On December 2nd the offices of French Potash & Import Company, New York, were moved to new quarters at 51 East 42nd Street. The telephone number is Murray Hill 2–4783.

CHARLESTON

Insistent Demand for Organics with Small Supply. Action on Fertilizer Price Ceiling Awaited. Producers Allocating Nitrogenous.

Exclusive Correspondence to "The American Fertilizer"

CHARLESTON, November 30, 1942.

There is an insistent demand for organics but at present these are exceedingly scarce. The manufacturers are anxiously awaiting authority from the OPA in regard to relief on the prices of mixed goods.

Nitrogenous—Producers of this material are still refusing to quote and all that is being shipped is on old contracts which have been allocated on a proportion of last fall's sales.

Castor Meal—No quotations are obtainable on this material.

Blood—There has been no change in this situation as no quotations can be obtained.

Cottonseed Meal—This material is hard to obtain. The nominal market for the 8 per cent grade is $35.60, Atlanta; $35.85, Augusta; $38.50 to $39.00, Memphis.

Goals for 1943 Farm Production Announced

Food-for-Freedom goals for 1943 calling for the highest production in the history of American agriculture were announced on November 30th by Secretary of Agriculture Claude R. Wickard. The goals are designed to shape next year's U. S. farm production to the needs of the United Nations.

At the same time, Secretary Wickard announced a price support program which pledges the Department to, "so far as possible, work out and maintain a price policy during the year which will give maximum price assistance to the production program." Included in the program are specific price support announcements for many major farm commodities.

In general, the goals are aimed at maintaining or exceeding the record level of pro-

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duction attained this year, but there are significant changes from the 1942 production pattern which throw sharp emphasis on crops and livestock most essential to the war effort. The goals are subject to any revisions which may be made necessary by military or other developments.

The goals and price support programs for 1943 were considered by the Foods Requirements Committee, of which Secretary Wickard is Chairman. The Committee regularly considers the military and civilian requirements and needs of the United Nations for United States food and fiber.

FARM PRODUCTION GOALS—1942 AND 1943

Commodity	1942 Goal Thousands	1942 Reported Thousands	1943 Goal Thousands
Wheat, acres	55,000	53,427	52,500
Rye,[2] acres	3,550	3,868	3,600
Rice, acres	1,320	1,481	1,380
Corn,[1] acres	93,750	91,098	95,000
Oats, acres	40,000	40,600	37,300
Barley, acres	16,000	18,193	18,000
Grain sorghum, acres	10,000	9,221	10,000
Hay, All,[2] acres	72,000	72,710	71,100
Flaxseed, acres	4,500	4,675	5,000
Soybeans for beans,[2] acres	9,000	10,900	10,500
Peanuts,[2] acres	5,000	4,173	5,500
Dry beans, acres	2,600	2,376	2,800
Dry peas, acres	665	530	665
Cotton, acres	25,000	24,005	22,500
Tobacco: acres			
Flue-cured	841	796	841[3]
Burley	383	356	421[3]
Other domestic	272	246	272[3]
Sugarcane, acres	330	331	340
Sugarbeets, acres	1,050	1,061	1,050
Potatoes, acres	3,060	2,845	3,160
Sweet potatoes, acres	850	757	757
Commercial truck crops, acres	1,840	1,738	1,720
Hay crop seeds, acres	4,919	3,339	4,709
Hemp, acres	....	....	300
Fruit (fresh), tons	15,018	15,271	14,610
Cattle and calves,[4] lb.	9,585,000	10,160,000	10,910,000
Sheep and lambs, lb.	940,000	1,009,000	990,000
Hogs, lb.	11,125,000	10,800,000	13,800,000
Lard, lb.	2,820,000	2,500,000	3,400,000
Milk, lb.	125,000,000	120,000,000	122,000,000
Eggs,[5] doz.	4,200,000	4,414,000	4,780,000
Chickens,[4] lb.	3,118,000	3,118,000	4,000,000
Turkeys, lb.	500,000	485,000	560,000

[1] Midpoint of range.
[2] Harvested acres.
[3] Allotment same as 1942, acreage expected same as 1942.
[4] Dressed weight.
[5] Total production

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St. Regis is a *specialized service* organization, with the widest experience in the design and manufacture of custom-built Multiwall Paper Bags and paper bag filling machines . . . and *in their use. All* this specialized knowledge and experience is yours for better packaging when you call St. Regis.

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Conservation of Extinguishers

Practically the entire output of approved fire extinguishers is being taken by the Army, the Navy, and manufacturers with top priority ratings, so that other users are finding it impossible to obtain new extinguishers.

Soda acid extinguishers have not been in production since the first of the year, nor have copper pump tanks, gas cartridge extinguishers of water and anti-freeze types, and extinguishers of any type with seamless drawn shells. Foam extinguishers are being made only in limited quantity and it takes a high priority to obtain them. Carbon dioxide extinguishers also are going only to those with ratings approaching the "triple A." Even the vaporizing liquid extinguishers, of which there are more in service than all other types put together, are difficult to obtain and one manufacturer is not promising deliveries to anyone with less than an A–1–J rating.

But recharging materials and replacement parts still can be purchased without difficulty, and as long as this condition persists, existing equipment can be readily kept in service. With proper servicing, approved equipment will last indefinitely.

"Approved" extinguishers are those which bear the label of the Underwriters' Laboratories or Factory Mutual Laboratories. All such extinguishers bear an instruction plate on which appear directions for recharging and inspecting the equipment. Only when these directions are ignored will the extinguisher owner encounter difficulty.

Attempts to economize by purchasing commercial grades of carbon tetrachloride for use in vaporizing liquid extinguishers are generally foiled by the resulting deterioration of the shell and interior mechanism of the extinguisher. Commercial grades of CTC contain water, which reacts slowly with the CTC to form hydrochloric acid and it is the latter that does the damage. The vaporizing liquid furnished by extinguisher manufacturers is treated to remove all impurities and has important components added, to depress the freezing point.

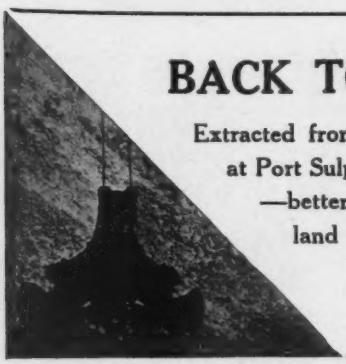
In the case of soda acid and foam extinguishers, shells and all parts should be thoroughly rinsed with warm water before recharging. This removes all vestiges of reacted and unreacted chemicals, so that the fresh charge will have its maximum force and duration. Another important part of the routine, the imspection of head gaskets, is often overlooked. If old and worn gaskets are used, it will be necessary to screw down the head of the extinguisher with unusual force, and even then, leakage during operation cannot always be overcome. A new gasket permits easy manual screwing on and off of extinguisher heads, and insures a tight extinguisher during use.

Many approved extinguishers have been in service for more than twenty years and are still good for many more years of duty. They do not "wear out." But they should be carefully handled when being recharged, inspected, or used. If dropped, or struck a severe blow, the shell may be distorted so that a seam is weakened. Such damage should be repaired only by the manufacturer who has the equipment and workmen capable of making repairs that will pass the inspection of the Underwriters' Laboratories, Inc., or the Factory Mutual Laboratories.

Here are a few simple rules for keeping extinguishers in service for the duration:

Place a man upon whom you can depend to see that directions are followed to the letter, in charge of recharging and inspection.

Provide him with recharging materials and replacement parts supplied by the manufacturer of the extinguishers.



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Then, hold him strictly accountable for the quality of his work, which will be reflected in the continuing good performance of the extinguishers.

W. W. Skinner Appointed Chief of Chemistry and Engineering, U. S. D. A.

Dr. William Woolford Skinner has been appointed chief of the Bureau of Agricultural Chemistry and Engineering to fill the vacancy left by the death of Dr. Henry G. Knight last July, the Department of Agriculture announced on November 24th.

Born in Baltimore, Maryland, in 1874, Dr. Skinner has had 38 years of intimate association with the work of the bureau, which he has helped direct as associate chief since 1939. Prior to that he had been assistant chief since 1935. He had also been assistant chief from 1921 to 1927, after which he was assigned to other duties in connection with chemical and technological research in the bureau.

Joining the bureau in 1904 as a food inspection chemist, Dr. Skinner has seen many changes in the organization he helped to build. In the old days it was known simply as the Bureau of Chemistry. Later it took on soils work and became Chemistry and Soils. A few years ago it became Chemistry and Engineering, indicating another change in the scope of the work. Since Pearl Harbor the bureau has been engaged in many vital war projects as one of the seven scientific agencies brought together in the Agricultural Research Administration, under the direction of Dr. E. C. Auchter.

During his long career as a Government chemist, Dr. Skinner has held office in various scientific organizations, and has served as chairman of the Maryland State Board of Agriculture and the Board of Regents of the University of Maryland.

Votes in Cotton Quota Referendum Urged

The U. S. Department of Agriculture has issued a statement by I. W. Duggan, Director of the Southern Division of the Agricultural Adjustment Agency, stressing the necessity of holding 1943 cotton production within the nation's needs, and urging all eligible cotton producers to vote in the cotton marketing quota referendum Saturday, December 12th.

"In the referendum, farmers will be voting on an allotment of slightly more than 27 million acres, or about the same as in 1942," Duggan said. "This is the minimum allotment under the Agricultural Adjustment Act. However, farmers are asked to underplant their allotments in 1943, just as they were asked and did in 1942, when several million acres of land normally planted to cotton and other crops were planted to war crops for which shortages existed. The 1942 planted acreage was a little over 24 million acres and the indicated production is 13.1 million running bales. Because we have on hand nearly two years' supply of short staple cotton, it is suggested that farmers substitute other war crops, such as cotton above one inch, peanuts and feed grains, for short staple cotton wherever these crops are adapted, and voluntarily hold down their cotton acreage in 1943."

Duggan termed cotton marketing quotas "a simple means of rationing the nation's needs fairly among all producers."

"Contrary to widespread rumors, cotton producers will vote only for the 1943 crop, as they did for each of the past five crop years, and not for a three-year period," he said.

In last year's cotton marketing quota referendum, 94 per cent of the nearly 850,000 producers who voted approved quotas for the present year. Two-thirds of those voting must approve quotas before they become effective.

Cotton producers are also reminded that unless quotas are approved, the cotton loan, which supports prices, cannot be in effect, under the law. The loan of 90 per cent of

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parity is the only thing that is holding the American price above the price of cotton in foreign countries, which for Brazil is 10.2 and for Peru is 11.4 cents per pound.

On Role of Boron in Plant Life

"Ten parts in a million of anything seem to minute a quantity to make a difference. Yet, to keep healthy and grow normally, plants need about 10 parts in a million of boron in the soil that nourishes them. If a plant does not get enough boron, it may be subject to such diseases as internal 'corking' of apples, 'yellows' of alfalfa, 'scratch' of celery, or 'canker' of beets. On the other hand, a trifle too much boron may retard plant growth, injure tissues, or even kill the plant. Such injuries have occurred from adding boron to acid, sandy soils that were previously deficient in boron. If a field is fertilized with a manure that has been treated with borax or colemanite to prevent fly hatching, the borax may poison the soil and injure the plants.

The desirable range in boron content is narrow. Heretofore, scientists have paid more attention to the poisonous effect of boron than to its importance as a plant food. Studies by U. S. Department of Agriculture on 300 soil samples showed boron in all types of soil. Soils derived from alluvium, limestone, shale, and glacial drift are likely to be high in boron; those from igneous rocks and unconsolidated sediment, low. But natural boron toxicity is unlikely except in very arid regions. Three large regions in the United States have soils that may have too little boron. These are the Atlantic and Gulf Coasts from Maine to Texas; northern Minnesota, Wisconsin, and Michigan; and California and the Pacific Northwestern States. Elsewhere boron deficiency is unlikely except in occasional small areas of peats, mucks, or soils developed under a high water table."

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Dragline attachment and bucket for 50-B Bucyrus Steam Shovel
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1—Centrifugal Pump, 200-foot head, 2,000 GPM., open impeller
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THE FERTILIZER SITUATION AND THE WAR

(Continued from page 9)

4. To increase the plantfood content of fertilizers in those regions using a large tonnage of low analysis grades.

A word of explanation about the change in plantfood ratios is probably needed as there has been some criticism on this point. The ratio had to be changed in order to reduce nitrogen consumption without reducing the use of phosphoric acid and potash. Furthermore, widening the ratio tends to increase the efficiency with which the nitrogen is utilized. Admittedly the phosphoric acid and potash may not be efficiently utilized in some instances, but in general their increased use should help offset the decrease in yield expected from the smaller application of nitrogen.

In adjusting the ratio of nitrogen to phosphoric acid and potash, the ratio was widened most in those regions in which the response to phosphoric acid and potash was relatively great as compared to response to nitrogen. The least change in ratio was made in the regions in which the need for nitrogen was relatively great. Considering the country as a whole the N-P_2O_5 ratio in 1942–43 will be similar to the ratio for 1927.

The selection of grades for each State, within the limitations imposed by the national objectives, was left to the agronomists of the several States. They cooperated fully and effectively in a series of seven regional grade conferences. The fertilizer industry as well as the agronomists then participated in a second series of conferences in which a few changes were made in the grades recommended by the agronomy conferences. Other minor changes

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See Page 4

were made before the new grades were made official by the issuance of Conservation Order No. M-231 by the War Production Board on September 12th.

It is too early to properly evaluate the results of the grade standardization program. The number of grades sold in the United States will be reduced from about 900 to 90. The grades per State will be reduced from an average of 88 to 16. This is a pretty good record but it now seems that the reduction in grades should have been more drastic in some States. Substantial progress has been made in securing grade uniformity within regions although there is room for further improvement in this respect.

Two other steps taken to conserve nitrogen are detailed in WPB Conservation Order No. M-231. They are (1) no chemical nitrogen in 1942 for fall-sown small grains to be harvested for grain, and (2) no chemical nitrogen for nonessential uses such as lawns, golf courses and parks. It is probable that the use of chemical nitrogen will be further restricted on corn in the commercial corn area, on all small grains in areas where there is little response to nitrogen, and on certain minor crops. It is estimated that these conservation measures will result in a saving of from 40,000 to 50,000 tons nitrogen, thereby reducing our requirements to 400,000 or 410,000 tons. Further reduction in nitrogen consumption should not be necessary.

A discussion of the nitrogen fertilizer situation would not be complete without reference to the use of oil-seed meals. The supply of oil-seed meals for domestic consumption has increased from a 1935–40 average of about 4,000,000 tons to estimated 8,225,000 tons in 1942. Much of this increase can be used for feed but very substantial quantities should be used in fertilizers. Normal consumption of oil-seep meals in commercial fertilizers is about 60,000 tons. The U. S. D. A. has recommended that an additional 500-000 tons be so used. The Office of Price Administration has recently indicated that fertilizer price ceilings will be adjusted to make possible the increased utilization of oil-seed meals. The fertilizer nitrogen supply may, therefore, be increased some 30,000 tons, making a total of 438,000 tons as compared to an adjusted requirement of 410,000 tons nitrogen. It is also probable that the use of cotton-seed meal for fertilizer on southern farms will increase substantially this year. Such an increase is desirable, should be encouraged, and will return a good profit to the farmer.

Following the establishment of the new grades, the U. S. D. A. and WPB worked out a schedule, for each State, showing which of the new grades are to be substituted for the grades formerly sold in the State. It is expected that the indicated substitution of grades will result in the manufacture and sale of a tonnage of mixed fertilizers approximately equivalent to the 1940–41 tonnage.

At the request of the War Production Board, the Fertilizer Industry Advisory Committee has suggested a plan for the distribution of mixed fertilizers and nitrogen materials to farmers. It is probable that the plan, after some modification, will be used in 1943. The industry has recognized the necessity and is willing to assume the responsibility for "a program and plan for the equitable distribution of the available supply to all buyers in a manner that will be fair to each and every user of fertilizer engaged in the production of agricultural commodities necessary to the war effort." The plan of the committee requires each purchaser of fertilizer to fill out a statement indicating "the quantities and grade of fertilizer purchased in 1941–42 and the quantity and grade desired for 1942–43 and the crops on which they are to be used."

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It is expected that WPB will employ field agents to act as liaison men between farmers, dealers, and fertilizer manufacturers. Finally, it is suggested that County War Boards be designated to serve as appeal or mediation boards to handle complaints regarding fertilizer distribution.

The fertilizer industry is to be commended for the way in which it has worked with various governmental agencies on fertilizer problems. It has assumed a real task in accepting the responsibility for the equitable distribution of fertilizers in 1943. It is expected to measure up to the task and opportunity.

A Forward Look

This discussion would not be complete unless some consideration was given to fertilizer problems that may confront us during the balance of the war years and in the post-war period.

Predictions regarding nitrogen supplies for agriculture for 1943–44 are not in order. Too much depends on the course of the war. We should be prepared to cope with a shortage as great or even greater than we face for 1942–43. Agronomists in every state should follow as closely as possible fertilizer usage this year and be prepared to recommend such changes as maybe necessary to meet plant food shortages, and secure more efficient utilization of available fertilizer supplies.

It is probable that some revision of fertilizer grades will be needed before another season. If so, State agronomists, within the limits imposed by national objectives, will be expected to select the grades. More uniformity within regions is desirable and several States should further reduce the number of grades to be offered for sale.

Some changes produced by war should be retained in the post-war period. Fertilizer grade limitation is one of these changes. Steps should be taken in many States to include a provision in the fertilizer control law or regulations that will make possible a reasonable limitation of grades of fertilizer to be offered for sale. Where such provisions are in effect, fertilizer grade selection is usually made by the agricultural college and the State fertilizer control officers, in consultation with representatives of the fertilizer industry.

The advent of war has shown how essential it is to have dependable statistics on plant-food consumption. State fertilizer grade tonnage reports are one of the most valuable sources for such data. Such reports, however, are not available for Delaware, Georgia, New Hampshire, Oregon, Tennessee, Virginia and Washington. Agronomists and the fertilizer control officials of those States would render their State and the nation a useful service if arrangements were made to secure such reports for 1942 and subsequent years.

The post-war period will present agronomists with the reverse of our war nitrogen problem. Under the impetus of war the country's capacity for producing synthetic ammonia is being vastly increased. Our total capacity will be more than twice as great as our maximum pre-war consumption of nitrogen for all purposes. There will be synthetic ammonia plants in ten or more states. It is expected that the farm price of nitrogen will be substantially lower than in recent years. The problem of the utilization of this nitrogen is to be studied by a National Joint Committee on Nitrogen Utilization. Members of this society will have an important place in the work of that committee.

Similar but less acute problems may face us with respect to the utilization of increased supplies of phosphoric acid and potash. Agronomists should lead in their effective utilization. The demands for research and leadership in the post-war years may well be as great or greater than in the war period.

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ACID BRICK
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
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Farmers Fertilizer Company, Columbus, Ohio.
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Phosphate Mining Co., The, New York City.
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Wellmann, William E., Baltimore, Md.

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Wellmann, William E., Baltimore, Md.

LOADERS—Car and Wagon, for Fertilizers
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Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Acid Making
Atlanta Utility Works, East Point, Ga.
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Chemical Construction Corp., New York City.
Duriron Co., Inc., The, Dayton, Ohio.
Fairlie, Andrew M., Atlanta, Ga.
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MACHINERY—Coal and Ash Handling
Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.

MACHINERY—Elevating and Conveying
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Hayward Company, The, New York City.
Link-Belt Company, Philadelphia, Chicago.
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Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

MACHINERY—Pumping
Atlanta Utility Works, East Point, Ga.
Duriron Co., Inc., The, Dayton, Ohio.

MACHINERY—Tankage and Fish Scrap
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

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Stedman's Foundry and Mach. Works, Aurora, Ind.

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American Agricultural Chemical Co., New York City.
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Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Bradley & Baker, New York City.
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Huber & Company, New York City.
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Schmaltz, Jos. H., Chicago, Ill.
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Chemical Construction Corp., New York City.

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Bradley & Baker, New York City.
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Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
McIver & Son, Alex. M., Charleston, S. C.
Smith-Rowland Co., Norfolk, Va.
Wellmann, William E., Baltimore, Md.

NOZZLES—Spray
Monarch Mfg. Works, Philadelphia, Pa.

PACKING—For Acid Towers
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Chemical Construction Corp., New York City.

PANS AND POTS
Stedman's Foundry and Mach. Works, Aurora, Ind.

PHOSPHATE MINING PLANTS
Chemical Construction Corp., New York City.

PHOSPHATE ROCK
American Agricultural Chemical Co., New York City.
American Cyanamid Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Phosphate Mining Co., The, New York City.
Ruhm, H. D., Mount Pleasant, Tenn.
Schmaltz, Jos. H., Chicago, Ill.
Southern Phosphate Corp., Baltimore, Md.
Virginia–Carolina Chemical Corp. (Mining Dept.), Richmond, Va.
Wellmann, William E., Baltimore, Md.

PIPE—Acid Resisting
Duriron Co., Inc., The, Dayton, Ohio.

PIPES—Chemical Stoneware
Chemical Construction Corp., New York City.

PIPES—Wooden
Stedman's Foundry and Mach. Works, Aurora, Ind.

PLANT CONSTRUCTION—Fertilizer and Acid
Chemical Construction Corp., New York City.
Fairlie, Andrew M., Atlanta, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.

POTASH SALTS—Dealers and Brokers
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
Bradley & Baker, New York City.
Huber & Company, New York City.
International Minerals & Chemical Corporation, Chicago, Ill.
Jett, Joseph C., Norfolk, Va.
Schmaltz, Jos. H., Chicago, Ill.
Wellmann, William E., Baltimore, Md.

POTASH SALTS—Manufacturers
American Potash and Chem. Corp., New York City.
Potash Co. of America, New York City.
International Minerals & Chemical Corp., Chicago, Ill.
United States Potash Co., New York City.

PULLEYS AND HANGERS
Atlanta Utility Works, East Point, Ga.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

PUMPS—Acid-Resisting
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
Monarch Mfg. Works, Inc., Philadelphia, Pa.

PYRITES—Brokers
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., New York City.
Wellmann, William E., Baltimore, Md.

QUARTZ
Charlotte Chem. Laboratories, Inc., Charlotte, N. C.

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ROUGH AMMONIATES
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McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
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Atlanta Utility Works, East Point, Ga.
Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
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Sackett & Sons Co., The A. J., Baltimore, Md.
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Link-Belt Company, Philadelphia, Chicago.
Sackett & Sons Co., The A. J., Baltimore, Md.
Stedman's Foundry and Mach. Works, Aurora, Ind.

SHOVELS—Power
Link-Belt Company, Philadelphia, Chicago.
Link-Belt Speeder Corporation, Chicago, Ill., and Cedar Rapids, Iowa.
Sackett & Sons Co., The A. J., Baltimore, Md.

SPRAYS—Acid Chambers
Monarch Mfg. Works, Inc., Philadelphia, Pa.

SPROCKET WHEELS (See Chains and Sprockets)

STACKS
Sackett & Sons Co., The A. J., Baltimore, Md.

SULPHATE OF AMMONIA
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Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Baker & Bro., H. J., New York City.
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Ashcraft-Wilkinson Co., Atlanta, Ga.
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Wellmann, William E., Baltimore, Md.

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Ashcraft-Wilkinson Co., Atlanta, Ga.
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International Minerals & Chemical Corporation, Chicago, Ill.
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SYPHONS—For Acid
Monarch Mfg. Works, Inc., Philadelphia, Pa.

TALLOW AND GREASE
American Agricultural Chemical Co., New York City.

TANKAGE
American Agricultural Chemical Co., New York City.
Armour Fertilizer Works, Atlanta, Ga.
Ashcraft-Wilkinson Co., Atlanta, Ga.
Baker & Bro., H. J., New York City.
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Jett, Joseph C., Norfolk, Va.
McIver & Son, Alex. M., Charleston, S. C.
Schmaltz, Jos. H., Chicago, Ill.
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Wellmann, William E., Baltimore, Md.

TANKAGE—Garbage
Huber & Company, New York City.

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Sackett & Sons, Co., The A. J., Baltimore, Md.

TILE—Acid-Proof
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Hayward Company, The, New York City.
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UREA
DuPont de Nemours & Co., E. I., Wilmington, Del.

UREA-AMMONIA LIQUOR
DuPont de Nemours & Co., E. I., Wilmington, Del.

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Charlotte Chem. Laboratories, Inc., Charlotte, N. C.
Duriron Co., Inc., The, Dayton, Ohio.
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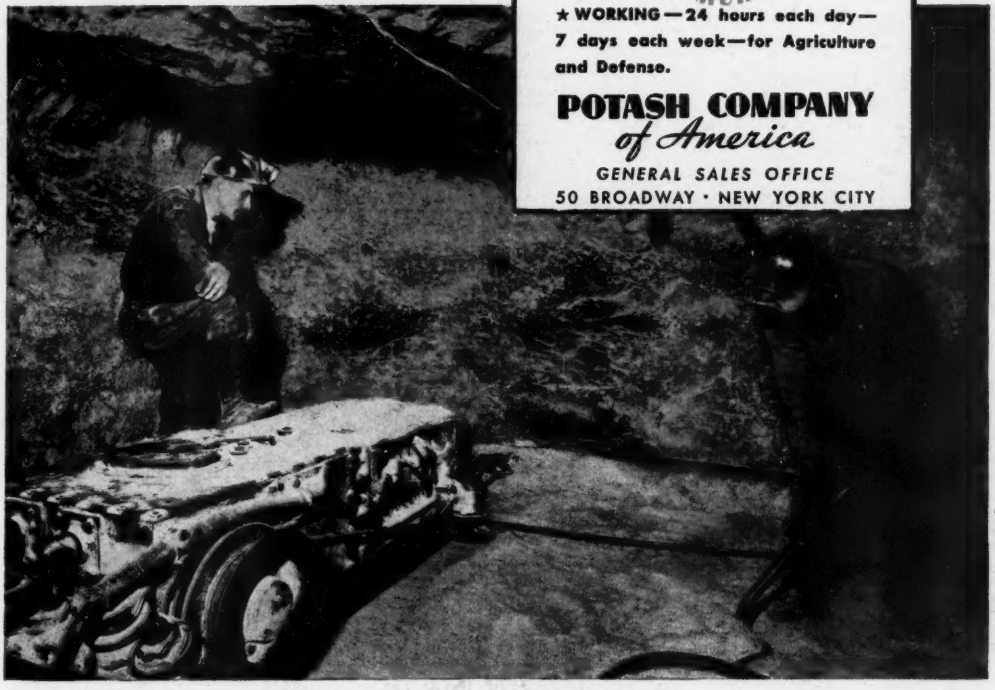

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